

# Annotated checklist of the recent and extinct pythons (Serpentes, Pythonidae), with notes on nomenclature, taxonomy, and distribution

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## Abstract

McDiarmid et al. (1999) published the first part of their planned taxonomic catalog of the snakes of the world. Since then, several new python taxa have been described in both the scientific literature and non-peer-reviewed publications. This checklist evaluates the nomenclatural status of the names and discusses the taxonomic status of the new taxa, and aims to continue the work of McDiarmid et al. (1999) for the family Pythonidae, covering the period 1999 to 2010. Numerous new taxa are listed, and where appropriate recent synonymies are included and annotations are made. A checklist and a taxonomic identification key of valid taxa are provided.

## Keywords

snakes, ICZN, *Antaresia*, *Apodora*, *Aspidites*, *Bothrochilus*, *Broghammerus*, *Leiopython*, *Liasis*, *Morelia*, *Python*, taxa

## Introduction

Pythons (family Pythonidae) represent a family of non-venomous basal snakes within the superfamily Pythonoidea Fitzinger, 1826 (*sensu* Vidal et al. 2007, Vidal and Hedges 2009). Although present in Europe during the Miocene, and probably since the late Eocene (Szyndlar and Rage 2003), pythons are now restricted to the warmer regions of

the Old World, ranging from Africa through South and Southeast Asia, Indo-Malaysia and New Guinea, to Australia (Kluge 1993, Scanlon 2001, Rawlings and Donnellan 2003, Rawlings et al. 2008). More than two thirds of the currently recognized extant species are found in the Australo-Papuan region (Kluge 1993, Scanlon 2001, Rawlings et al. 2008), where they have the greatest level of morphological and genetic diversity (Heads 2002, Rawlings and Donnellan 2003), and a high degree of endemism (Harvey et al. 2000, Rawlings et al. 2004). Whereas two Asian species (*P. molurus* and *P. bivittatus*) range north of the Tropic of Cancer, an African and at least seven Australian species extend their ranges south of the Tropic of Capricorn. Pythons occur in a variety of habitats, from desert and savanna, to subtropical and tropical rainforest (Kluge 1993) and into seasonally flooded grasslands and paddifields. Most species are terrestrial, some are arboreal (Kluge 1993) and a few are semi-aquatic. The 40 recognized extant species range in maximum adult length from 0.61 m to 10.0 m, and include the longest extant snake species.

### Taxonomic changes since 1999

McDiarmid et al. (1999) has become a standard reference for snake taxonomists. Since then python systematics has received considerable attention as new phylogenetic and geographical evidence has become available. Aside from the descriptions of new genera, species, and subspecies (Table 1), the most noteworthy action was the split of the genus *Python* by Rawlings et al. (2008), placing two Asian taxa, *reticulatus* and *timo-riensis*, into *Broghammerus*.

One author, the amateur herpetologist Raymond T. Hoser of Victoria, Australia, has caused considerable confusion in python taxonomy over the last decade by describing numerous taxa (6 new genera and subgenera, 4 new species, and 19 new subspecies) in the non-peer-reviewed literature without providing adequate descriptions for his proposed new taxa (for discussions see Aplin 1999, 2002, Wüster et al. 2001, Williams et al. 2006, 2008, Schleip 2008). Hoser rarely included important taxonomic information or data on scale counts, numbers of specimen examined, statistics, or the results of DNA analysis. Moreover, Hoser designated several types without ever having apparently examined them. Although not mandatory, the International Code of Zoological Nomenclature (ICZN 1999), hereafter termed the “Code”, recommends that only specimens personally examined by the author should be designated as types (Recommendation 73B). Furthermore, Hoser himself (1996, 1997) considered failing to examine type specimens “sloppy taxonomy”. Another recommendation (Recommendation 73C), which states which data should be provided with the holotype, is often not followed by this author. In general, inadequate descriptions inevitably lead to problems in clearly assigning specimens to established taxa, and are expensive and time-consuming for subsequent workers who have to re-examine the type material in order to make taxonomic decisions, instead of being able to rely on adequate original descriptions.

**Table 1.** New and resurrected taxa from 1999 until 2010. Numbers in parentheses represent the number of taxa deemed unavailable.

| Year          | New genera | Resurrected genera | New species | Resurrected species | Elevated to species rank | New subspecies | Resurrected subspecies |
|---------------|------------|--------------------|-------------|---------------------|--------------------------|----------------|------------------------|
| 1999          | 0          | 0                  | 0           | 0                   | 2                        | 0              | 0                      |
| 2000          | 2(1)       | 2                  | 5           | 0                   | 8                        | 7              | 2                      |
| 2001          | 0          | 0                  | 0           | 0                   | 3                        | 0              | 0                      |
| 2002          | 0          | 0                  | 1           | 0                   | 0                        | 2              | 0                      |
| 2003          | 0          | (1)                | 1(2)        | (1)                 | 0                        | (3)            | 0                      |
| 2004          | 2          | 4                  | 2           | 1                   | 0                        | 9              | 0                      |
| 2005          | 0          | 0                  | 0           | 0                   | 0                        | 0              | 0                      |
| 2006          | 0          | 0                  | 0           | 0                   | 0                        | 0              | 0                      |
| 2007          | 0          | 0                  | 0           | 0                   | 0                        | 0              | 0                      |
| 2008          | 0          | 0                  | 3           | 0                   | 3                        | 0              | 0                      |
| 2009          | (2)        | 0                  | 0           | (2)                 | (1)1                     | (4)1           | 0                      |
| 2010          | 0          | 0                  | 0           | 0                   | 0                        | 0              | 0                      |
| <b>Total*</b> | <b>4</b>   | <b>6</b>           | <b>12</b>   | <b>1</b>            | <b>17</b>                | <b>19</b>      | <b>2</b>               |

\* Total figures exclude those taxa considered unavailable.

In general, the professional herpetological community has rarely accepted Hoser's taxa (Wüster et al. 2001, Aplin 2002, Williams et al. 2006, 2008, Schleip 2008, Zaher et al. 2009) unless one of his numerous names turns out to be valid and a senior synonym based on more exacting scientific work carried out by professional researchers, as was the case with *Broghammerus*.

## Approach and Scope

The primary objective of this taxonomic checklist is to provide an overview of the taxa in the family Pythonidae, and to establish their nomenclatural status under the provisions of the Code and their current taxonomical status based on published works and knowledge. It is, however, beyond the scope of this list to propose re-classifications or re-arrangements of genera that lack fully resolved phylogenetic relationships. Although this checklist can only be a snapshot in time, it is intended to continue the work of McDiarmid et al. (1999) for the family Pythonidae over the past decade and provide updates to the list compiled by Henderson and Powell (2007). For taxa described during the past decade type species (for generic names) or type specimens (for specific names) are provided along with their type localities. Recently designated neotypes are also provided. Where new distributional information is available, this is included with the relevant citation. However, in contrast to the work of McDiarmid et al. (1999) and Henderson and Powell (2007), this checklist also contains extinct taxa.

Taxa are hierarchically arranged by indentation, and are presented in alphabetical order at the level of genera, species, and subspecies, although, in the case of sub-

species, the nominate subspecies precedes other subspecies, which then are listed in alphabetical order. Annotations are made directly below the relevant taxon, unless otherwise stated. Synonyms before the year 1999, and remarks on valid taxa, unless new data are available, can be found in McDiarmid et al. (1999). A key to the extent genera, species and subspecies recognized within the family of Pythonidae is provided in Appendix 2.

## Interpretation and application of the Code

The Code rules on issues regarding nomenclatural acts and works, and aims to “provide the maximum universality and continuity in the scientific names of animals compatible with the freedom of scientists to classify animals according to taxonomic judgments” (ICZN 1999). Due to its universality, the wording of the Code leaves considerable room for interpretation. For the assessment of the nomenclatural status of published names, and for the purpose of nomenclatural stability, the Code was here strictly applied to all names. In any case of ambiguous wording, the authors have consulted the glossary of the Code as suggested in the Code’s “Explanatory Note”, and as stated in article 89. In the checklist we use the abbreviation “APP” (application):

**APP1. “Characters”:** To be available a name must “be accompanied by a description or definition that states in words characters that are purported to differentiate the taxon” (ICZN 1999: Art. 13.1.1). A description in the meaning of the Code is “a statement in words of taxonomic characters of a specimen or a taxon” (ICZN 1999: glossary entry for “description”), and a definition is “a statement in words that purports to give those characters which, in combination uniquely distinguish a taxon” (ICZN 1999: glossary entry for “definition”). The glossary defines the word taxon as a “taxonomic unit, whether named or not: i.e., a population, or group of populations of organisms which are usually inferred to be phylogenetically related and which have characters in common which differentiate (...) the unit (e.g., a geographic population, a genus, a family, an order) from other such units” (ICZN 1999: glossary entry for “taxon”). This latter statement clearly excludes distribution itself as a character to differentiate taxa and that complies with article 13.1.1, since it requires characters to differentiate a “geographic population” from other such units. Many taxonomists are likely to accept a geographic population, especially an insular population, only separated from other such populations by distribution, at subspecific rank. However, the Code does not distinguish between specific and subspecific rank in its requirements (Arts. 45.1, 45.2), and therefore subspecies must also be distinguishable by characters other than by their isolated locality or distribution.

**APP2. “Generalized statements”:** Generalized statements such as “separated by distribution” or “separated by analysis of DNA” or relative statements such as “usually (but

not always) has” do not constitute a character in the sense of article 13.1.1 (APP1). Analysis of DNA clearly describes a method although genomic differences are of diagnostic value, and distribution itself is not a character, as it is not intrinsic to any specimen within the taxon. Therefore, these are not attributes of an organism (see glossary for character). Moreover, strictly following the glossary definition of the word description, the Code would require that a taxon must be uniquely distinguished from other taxa and generalized statements do not imply uniqueness.

**APP3.** “Priority”: Article 23.3.5 requires the replacement of an unavailable name with the oldest available synonym (senior synonym).

**APP4.** “Incorrect subsequent spelling”: Article 33.3 states that “any subsequent spelling of a name different from the correct original spelling, other than a mandatory change or an emendation, is an “incorrect subsequent spelling”; it is not an available name and, like an incorrect original spelling (...), it does not enter into homonymy and cannot be used as a substitute name” (ICZN 1999). For species-group names article 11.9.3.2 states that they are “deemed to have been published in combination with the correct original spelling of the generic name, even if it was actually published in combination with an emendation or incorrect spelling of the generic name” (ICZN 1999). Therefore, incorrect subsequent spellings are corrected to the original spelling.

**APP5.** “*Nomen dubium*” (pl. *nomina dubia*): According to the glossary of the Code a *nomen dubium* is “a name of unknown or doubtful application” (ICZN 1999). This glossary definition leaves a wide scope for applying the term. A *nomen dubium* may be a lost type specimen or a type that lacks important diagnostic features so that a name cannot be applied to a specimen with clarity. Melville (1980, 1984) noted that considering a name as *nomen dubium* is a matter of taxonomic decision and not a nomenclatural one. Moreover, Mones (1989) revealed that this term was first used for a taxon which was accompanied by an insufficient description. He states that the term “(...) denotes ignorance, incapability to interpret the facts, insufficient diagnosis, or actual poorness of the type specimen” (Mones, 1989: 232). We agree with the above mentioned views and, hence, insufficient information on the holotype (Recommendations 72E, 73A, see Introduction) that obviously was randomly chosen from an online database of a natural history museum and was not examined by the author (Recommendation 73B) along with an insufficient diagnosis or definition of taxonomic characters (see Art. 13.1.1, Recommendation 13A) may make a name be considered a *nomen dubium*. However, the name remains available, and a subsequent revision or re-description of the taxon may establish its validity.

**APP6.** “*Nomen nudum*” (pl. *nomina nuda*): For generic names to be available, the Code requires “the fixation of a type species in the original publication” (ICZN 1999: Art. 13.3). All names must be “explicitly indicated as intentionally new” (ICZN 1999:

Art. 16.1). Generic names, as well as specific and subspecific names, to which no characters were provided that comply with article 13.1.1 (see APP1, APP2), are deemed a *nomen nudum*, and therefore considered unavailable.

**APP7.** “*Species inquirenda*” (pl. *species inquirendae*): This is “a Latin term meaning a species of doubtful identity requiring further investigation” (ICZN 1999: glossary entry).

**APP8.** “Unavailable name”: A name is regarded as unavailable under the provisions of the Code, if either the requirements for publication or the requirements for availability are not met. This seems to be the case for names published by Hoser in his self-published Australasian Journal of Herpetology. Although the journal’s website states that several hard copies were placed in libraries to comply with the Code, these authors were unable to locate hard copies from any major European or North American library, or obtain such from the publisher when first issued (also see Recommendations 8B–D). An order form for hard copies (<http://www.smuggled.com/AJHHCO1.htm>, accessed 17 May 2009) was added to the publisher’s website on 7 May 2009. The National Library of Australia (NLA), the only library that lists this journal in their catalog, also has no hard copy (enquiry # NLAref21927, 16 April 2009) and only the PDF of the second issue (Hoser 2009) of the journal as of 17 May 2009 (NLA copy request CDC-10117150, 9.V.2009 could not be processed). Articles 8.1.2 and 8.1.3 of the Code state that to be regarded as published works they “must be obtainable, when first issued (... )”, and “must have been produced in an edition containing simultaneously obtainable copies by a method that assures numerous identical and durable copies”. Neither requirements was fulfilled. Later (20 May 2009), a colleague requesting original printed hard copies directly from the publisher only receiving single-sided, black and white versions of the online papers, printed on a domestic laser printer and bound by a large staple on the upper left hand corner (V. Wallach, pers. comm.). On his website, the publisher states “both print (first print run) and online are identical including use of color”. Therefore, the hard copy received by our colleague was apparently “printed on demand”. Article 9.7 states that “copies obtained on demand of an unpublished work [Art. 8], even if previously deposited in a library or other archive” do not constitute published work. The publisher disseminates the articles via the internet as PDFs downloadable from the journal’s website, and appears to rely on the trust of subsequent workers, that paper copies do exist (e.g., Zaher et al. 2009). However, the dissemination of PDFs over the internet does not currently constitute “published works” (Art. 9.6). Since no hard copies of the relevant second issue (Hoser 2009) were obtainable when first issued, and requested hard copies were “printed on demand”, this work must be regarded as “not published” under the provisions of the Code (Arts. 8.1.2, 8.1.3, 8.6, 9.6, 9.7) and the names therein are deemed unavailable (also see Wallach et al. 2009). The names, however, are listed for the completeness of the list but are not part of the formal synonymy.

## Abbreviations for Depositories of type material

|             |   |
|-------------|---|
| <b>AM</b>   | Australian Museum, Sydney, Australia                                  |
| <b>AMNH</b> | American Museum of Natural History, New York, NY, USA                 |
| <b>BPBM</b> | Bernice P. Bishop Museum, Honolulu, Hawaii, USA                       |
| <b>CAS</b>  | California Academy of Sciences, San Francisco, California, USA        |
| <b>FMNH</b> | Field Museum, Chicago, IL, USA  |
| <b>MCZ</b>  | Museum of Comparative Zoology, Harvard University, Cambridge, MA, USA |
| <b>NMV</b>  | Museum of Victoria, Melbourne, Australia                              |
| <b>MNHN</b> | Muséum national d'Histoire naturelle, Paris, France                   |
| <b>QM</b>   | Queensland Museum, Brisbane, Queensland, Australia                    |
| <b>RMNH</b> | Naturalis, Leiden, The Netherlands                                    |
| <b>SAMA</b> | South Australian Museum, Adelaide, South Australia, Australia         |
| <b>UTA</b>  | University of Texas at Austin, Austin, Texas, USA                     |
| <b>WAM</b>  | Western Australian Museum, Perth, Western Australia, Australia        |
| <b>ZFMK</b> | Zoologisches Forschungsinstitut und Museum Koenig, Bonn, Germany      |
| <b>ZMUC</b> | Zoologisk Museum, Copenhagen, Denmark                                 |

## Checklist of the Pythonidae

### Genus *Antaresia* Wells and Wellington, 1984

**Remarks:** Cogger (2000) did not recognize this genus but placed the four species recognized therein without subspecies in the genus *Liasis* Gray.

#### *childreni* (Gray, 1842)

#### *maculosa* (Peters, 1873)

##### Synonyms:

*Antaresia maculosa brentonoloughlini* Hoser, 2004

**Distribution:** O'Shea et al. (2004) reported the first occurrence outside Australia, at Weam, Western Province, Papua New Guinea.

***maculosa brentonoloughlini* Hoser, 2004** [synonym of *A. maculosa*]

**Holotype:** AM R16772.

**Type locality:** 16 km east of Coen, Queensland, Australia.

**Remarks:** Hoser (2004) separated this taxon from the nominate subspecies "by its greater preponderance of light colouration relative to dark blotches on the dorsal surface" (Hoser 2004), stating that the nominate form would "have roughly half to half (50:50) dark versus light blotches" whereas the ra-

tio in this taxon “is generally at least 60% light colour to 40% or less darker blotches” (Hoser 2004), and by larger average size.

### *perthensis* (Stull, 1932)

#### *stimsoni* (LA Smith, 1985)

#### *stimsoni stimsoni* (LA Smith, 1985)

***stimsoni campbelli* Hoser, 2000** [synonym of *A. stimsoni orientalis*]

**Holotype:** AM R69087.

**Type locality:** Wilcannia, New South Wales, Australia.

**Remarks:** The holotype of this taxon is also the paratype of *A. s. orientalis* Smith, 1985. Hoser (2000) separated this taxon from “other subspecies” by distribution (APP1, APP2), and from “other *A. stimsoni*” by color. Hoser (2000) cited without acknowledgment a statement made by Ehmann (1992) and quoted by Kend (1997: 148) and added to the statement, “the snout has a less box-like anterior when compared with other *A. stimsoni*” (Hoser 2000). However, since he considered *A. stimsoni* a synonym of “*A. saxacola*” (see comments on *A. s. orientalis*) and *A. stimsoni stimsoni* a separate subspecies, it is not clear what he means by *A. stimsoni*. This taxon is placed in the synonymy of *A. stimsoni orientalis* until further research has assessed its validity. Subsequent workers (e.g., Sonnemann 2007) have not recognized this taxon.

#### *stimsoni orientalis* (LA Smith, 1985)

#### **Synonyms:**

*Antaresia stimsoni campbelli* Hoser, 2000

**Remarks:** Hoser (2000) resurrected the name *A. saxacola* Wells and Wellington, 1985, but, contrary to Hoser’s (2000) claims that *A. stimsoni* Smith, 1985 (Hoser provided an incorrect date: Smith 1995) would be a subjective junior synonym of *A. saxacola orientalis* Smith, 1985 (see Shea and Sadlier 1999), the date of publication for Smith (1985) preceded Wells and Wellington (1985) as stated by Wells (2009), which makes *A. saxacola* a subjective junior synonym of *A. stimsoni*. Nevertheless, because Wells and Wellington did not provide a description for *A. saxacola*, the name was considered a *nomen nudum* by Underwood and Stimson (1990) and Shea and Sadlier (1999). We agree with these authors in considering “*saxacola*” a *nomen nudum* (APP6), and *orientalis* replaces it (APP3). *A. stimsoni orientalis* was not listed by Cogger (1992), Barker and Barker (1994), Cogger (2000) and Henderson and Powell (2007), but was recognized by others (e.g., Ehmann 1992, Kend 1997, Walls 1998, Torr 2000, Wilson and Swan 2008).

## Genus *Apodora* Kluge, 1993

**Remarks:** Kluge (1993) established this monotypic genus for the species *papuana*, which until then was included in the genus *Liasis* Gray as *Liasis papuanus*. Because of the lack of clarity concerning the phylogenetic position of this taxon (*Liasis*, *Apodora* (*Morelia*, *Python*)) (see Kluge, 1993: fig. 28), Kluge (1993: 53) characterized it with the term “*sedis mutabilis*” (of changing phylogenetic position, *sensu* Wiley, 1981, convention 4). However, recent researchers found some of the anatomical and morphological characters used in previous phylogenetic studies unsuitable due to misidentification (e.g., Scanlon 2001) or homoplasy (e.g., Wilcox et al. 2002, for detailed discussion see Rawlings et al., 2008). Scanlon (2001) analyzed a modified version of the dataset used by Kluge (1993) and found the genus *Liasis* to be paraphyletic (see Scanlon 2001: fig. 26). Later Rawlings et al. (2004) placed *A. papuana* as the sister clade to all other species of *Liasis*, which supports the separation of *A. papuana* as proposed by Kluge (1993), but this position was not well supported by their data. More recently, Rawlings et al. (2008) indicated a relationship between *A. papuana* and *L. olivaceus* within the monophyletic genus *Liasis*, both taxa forming a sister clade to the *L. fuscus/mackloti* complex, but again this position was not well supported. Hence, in anticipation of more robust data, we retain the current placement of this genus.

### *papuana* (Peters & Doria, 1878)

#### Synonyms:

*Liasis papuanus* Peters & Doria – Hoser, 2000, 2004

*Apodora papuana* (Peters & Doria) – Rawlings and Donnellan, 2003; Henderson and Powell, 2007; Rawlings et al., 2008

## Genus *Aspidites* Peters, 1877

**Remarks:** Henderson and Powell (2007) and Swan (2007) did not list subspecies within *Aspidites*. *Aspidites* was considered most primitive within the Pythonidae (e.g., Stimson and Underwood 1990, Kluge 1993) due to a lack of thermoreceptive pits in the labial scales. However, current research (Westhoff and Collin 2008) has revealed that *Aspidites* possesses a single thermoreceptive pit within the rostralia.

### *melanocephalus* (Krefft, 1864)

#### Synonyms:

*Aspidites melanocephalus adelynensis* Hoser, 2000

*Aspidites melanocephalus davieii* Hoser, 2000

*Aspidites melanocephalus rickjonesii* Hoser, 2009 (unavailable name, APP8)

***melanocephalus adelynensis* Hoser, 2000** [synonym of *A. melanocephalus*]**Holotype:** WAM R51208 (see remarks).**Type locality:** Wyndham, Western Australia.

**Remarks:** Hoser (2000) provided the same erroneous accession number for the holotype as was already provided by Smith (1985) in his original description; WAM R51208 is the number for a skink, *Eremiascincus isolepis* (fide Mecke et al. 2009) (Doughty, pers. comm.). Hoser (2000) separated this taxon from the nominate form by lower loreal, subocular, and parietal scale counts (see Barker and Barker 1994: 1–2). The same is stated to be diagnostic for *A. m. davieii*, which makes them indistinguishable from each other, as already noted by Aplin (2002: 55–56) who considered *A. m. adelynensis* the senior synonym due to page priority. The name is placed in the synonymy of *A. melanocephalus* until further research can clarify its taxonomic position.

***melanocephalus davieii* Hoser, 2000** [junior synonym of *A. m. adelynensis* and of *A. melanocephalus*]**Holotype:** WAM R46170.**Type locality:** Tom Price, Western Australia.

**Remarks:** Contrary to Aplin (2002: 56), we do not consider this name a *nomen nudum* because Hoser (2000) provided characters that purport to differentiate it from the nominate form. However, based on Hoser's (2000) description, this taxon is indistinguishable from *A. m. adelynensis* (see comments above). The name is therefore considered a subjective junior synonym of *A. m. adelynensis* and is placed into the synonymy of *A. melanocephalus*.

***melanocephalus rickjonesii* Hoser, 2009** [unavailable name (APP8)]**Holotype:** WAM 46170.**Type locality:** Tom Price, Western Australia.

**Remarks:** Hoser (2009) had designated the same holotype and paratypes as for *A. m. davieii*. The name is considered “not published” under the provisions of the Code (APP8) but would nevertheless be an objective junior synonym of *A. m. davieii*.

***ramsayi* (Macleay, 1882)****Synonyms:***Aspidites ramsayi panoptes* Hoser, 2000*Aspidites ramsayi richardjonesii* Hoser, 2000*Aspidites ramsayi neildavieii* Hoser, 2009 (unavailable name, APP8)*Aspidites ramsayi neildavieii* Hoser, 2009 [unavailable name (APP8)]**Holotype:** WAM 34070.**Type species:** near Port Hedland, Western Australia.

**Remarks:** Designation of the same type as for *A. r. richardjonesi*. The name is considered “not published” under the provisions of the Code (APP8) but would nevertheless be an objective junior synonym of *A. r. richardjonesi*.

***ramsayi panoptes* Hoser, 2000** [synonym of *A. ramsayi*]

**Synonyms:**

*Aspidites ramsayi richardjonesii* – Hoser, 2000

**Holotype:** WAM R43459.

**Type locality:** Burracoppin, Western Australia.

**Remarks:** Distinguished from “the main race” by lower average ventral and subcaudal scale counts (citing Barker and Barker [1994: 5] in support of this claim), color darkening above the eye in adults, and “from all other Wommas by distribution” (Hoser 2000: 10) (APP1, APP2). Because of the vague description of this taxon, specimens cannot be unambiguously assigned to this taxon. The name is placed into the synonymy of *A. ramsayi*. For further comments see *A. r. richardjonesii*.

***ramsayi richardjonesii* Hoser, 2000** [junior synonym of *A. r. panoptes*]

**Holotype:** WAM R34070.

**Type locality:** near Port Hedland, Western Australia.

**Remarks:** Aplin (2002) considered this taxon a *nomen nudum*. We disagree because Hoser (2000) provided characters that purport to differentiate this taxon from the “main race”. Nevertheless, this taxon is indistinguishable from *A. r. panoptes*, as both taxa share the diagnostic characters and are only separated by “vast distance” (Hoser 2000) (APP1, APP2) (also see Wüster et al. 2001). Without further data, these taxa must be treated as synonyms, with *A. r. panoptes* having priority.

**Genus *Aspidoboa* Sauvage, 1884** [synonym of *Python*]

**Remarks:** Hoser (2004) resurrected this genus to include the species of the *Python curtus* complex (*sensu* Keogh et al. 2001). As demonstrated by Rawlings et al. (2008) after exclusion of the taxa *reticulatus* and *timoriensis* (see *Broghammerus*), the genus *Python* forms a monophyletic grouping, including the taxon *brongersmai*. Since Keogh et al. (2001) demonstrated that *brongersmai* is the sister taxon to *curtus* and *breitensteini*, separating these three taxa from the genus *Python* would result in the non-monophyly of the genus. It is our opinion that the recognition of *Aspidoboa* at subgeneric rank only causes confusion and is unnecessary in a low-diversity genus as *Python*.

## Genus *Australiasis* Wells & Wellington, 1984 [synonym of *Morelia*]

### Synonyms:

*Austroaliasis* Hoser, 2000 (incorrect subsequent spelling, APP4)

**Remarks:** Hoser (2004) used the correct spelling rather than his earlier incorrect spelling of this taxon as “*Austroaliasis*” (see below) but also included the species of the *amethystina*-complex (*sensu* Harvey et al. 2000) and furthermore added *timorensis* (APP4) Peters, 1877. Nevertheless, Hoser only listed this genus without comment or evidence for its resurrection.

### *amethystinus* (Schneider, 1801) [synonym of *M. amethystina*]

#### *amethystinus clarki* (Barbour, 1914) [synonym of *M. amethystina*]

### Synonyms:

*Austroaliasis amethystinus clarki* (Barbour) – Hoser, 2000 (APP4)

*Australiasis amethystina clarki* (Barbour) – Hoser, 2004 (APP4)

*Australiasis clarki* (Barbour) – Hoser, 2009 (APP8, see introduction)

**Remarks:** Hoser (2000) resurrected this taxon from the synonymy of *M. amethystina* and placed it along with the nominal form *amethystina amethystina* and the taxon *timorensis* Peters, 1877 (APP4, incorrect subsequent spelling of *timo-riensis* Peters, 1877) into the genus “*Austroaliasis*”. This generic name constitutes an incorrect subsequent spelling (APP4) of the genus *Australiasis* Wells and Wellington 1984. Harvey et al. (2000) examined the holotype of *Liasis clarki* Barbour and found it to be “conspecific with *M. amethystina*, rather than *M. kinghorni*” (Harvey et al. 2000: 155) and documented that “at least some snakes from [the Torres Strait] islands are *M. amethystina* (e.g., the Murray Islands where the type *Liasis clarki* was collected)” (Harvey et al. 2000: 162). Until further studies have evaluated the taxonomic status of this population, this taxon is placed in the synonymy of *M. amethystina*. Henderson and Powell (2007) did not recognize this taxon.

### *duceboracensis* (Günther, 1879) [synonym of *M. amethystina*]

**Remarks:** Hoser (2004) listed this taxon for the population referred to as *M. amethystina* from New Ireland, Bismarck Archipelago, Papua New Guinea (see remarks on *M. amethystina* and *M. clarki*) without justification. Until further research has been carried out into the status of pythons in the Bismarck Archipelago, this species is herein assigned to the synonymy of *M. amethystina*.

## Genus *Austroaliasis* Hoser, 2000 [incorrect subsequent spelling of *Australiasis* Wells and Wellington, 1984 (APP4)]

**Remarks:** Hoser (2000) intending to resurrect *Australiasis* Wells and Wellington, 1984 created an incorrect subsequent spelling. Under the rules of the ICZN, this name is not an available name (Art. 33.3, ICZN 1999). See *Australiasis*.

## Genus *Bothrochilus* Fitzinger, 1843

**Remarks:** Rawlings et al. (2008) identified a sister-group relationship of this monotypic genus with *Leiopython*, which they also considered monotypic. They proposed synonymy of *Leiopython* with *Bothrochilus*, with the latter being the senior synonym. Also see comments on *Leiopython*.

### *boa* Fitzinger, 1843

## Genus *Broghammerus* Hoser, 2004 *fide* Rawlings et al. (2008)

**Type species:** *Python reticulatus* Schneider, 1801

**Remarks:** Subsequent workers did not recognize *Broghammerus* until a new analysis combining morphological and molecular evidence (Rawlings et al. 2008) led to a split of the genus *Python*. The latter authors expanded Hoser's original concept of the genus to include the taxon *timoriensis* Peters, since they demonstrated that this species is more closely related to *B. reticulatus* than species retained within the genus *Python* (or to *Austroliasis* [i.e., *Morelia*], the genus to which Hoser assigned *timoriensis*).

### *reticulatus* (Schneider, 1801)

**Neotype:** ZFMK 32378. Type locality: Rengit, West Malaysia; designated by Auliya et al. (2002).

### *reticulatus reticulatus* (Schneider, 1801)

#### Synonyms:

- Python reticulatus reticulatus* (Schneider) – Auliya et al., 2002
- Broghammerus reticulatus dalegibbonsi* Hoser, 2004
- Broghammerus reticulatus euandedwardsi* Hoser, 2004
- Broghammerus reticulatus neilsonnemani* Hoser, 2004
- Broghammerus reticulatus patrickcouperi* Hoser, 2004
- Broghammerus reticulatus stuartbigmorei* Hoser, 2004

**Distribution:** For records in western Thailand, see Pauwels et al. (2003). O'Shea and Lazell (2008) reported a specimen from Itbayat Island, Batanes Province, Philippines, the northeastern-most record for the taxon.

**Remarks:** Hoser (2004) describes the nominate form as "largish regional race with brownish head, much the same colour as the lighter dorsal body markings, although light-headed specimens are known and several colour variants and distinct colour mutations are also known".

### *reticulatus dalegibbonsi* Hoser, 2004 [synonym of *B. r. reticulatus*]

**Holotype:** FMNH 142320.

**Type locality:** Ambon, Makulu (=Moluccas), Indonesia.

**Remarks:** Hoser (2004) asserts that size and color separate this subspecies from the nominate subspecies. The statement “generally smaller race” is as unspecific as the statement made for the size of the nominate form (see remarks there). Therefore, a differentiation of both based on size is nearly impossible. Hoser (2004) describes the color of this subspecies by stating “it rarely has a head lighter than the body as in some other variants of *Broghammerus*, such as those from Bali or parts of Thailand” (Hoser 2004). Based on this statement, this subspecies is indistinguishable from the nominate form (see remarks for *B. reticulatus*). No other characters are provided. Simply stating “best separated from all other *Broghammerus* by DNA analysis and/or accurate distribution information” does not constitute a statement of characters (APP1, APP2). The name is placed into the synonymy of the nominate form.

*reticulatus euannedwardsi* Hoser, 2004 [*nomen dubium*, synonym of *B. r. reticulatus*]

**Holotype:** FMNH 180232.

**Type locality:** Nakhon Ratchasima, Central Thailand.

**Remarks:** Hoser (2004) separated this subspecies from the nominate subspecies by size, stating that this would be “a large race”. However, the nominate form was also claimed to be “largish”, hence, the former statement cannot separate this taxon from the nominate form. No further characters are provided to separate this taxon from other subspecies. The name is herein treated as *nomen dubium* (APP5) and is assigned to the synonymy of the nominate form.

*reticulatus haydnmacphiei* Hoser, 2004 [synonym of *B. r. reticulatus*]

**Holotype:** FMNH 148968.

**Type locality:** Sarawak, Borneo, West Malaysia.

**Remarks:** In the original description, Hoser (2004) violated the Principle of Binominal Nomenclature (Arts. 5.2, 11.4.2) (*B. r. haydn macphiei*). In accordance with articles 11.9.5 and 32.5.2.2, the name was corrected to comply with this principle. The author separates this taxon from the nominate form (referred to as “normal *reticulatus*”) only by “larger average adult size” (Hoser 2004) (also see comments for *B. r. euannedwardsi*). Therefore, this taxon is indistinguishable from *B. r. euannedwardsi* or from *B. r. reticulatus* and is placed in the synonymy of the latter. Auliya et al. (2002) demonstrated that specimens from Bali, West Malaysia, Java, West Kalimantan, and Vietnam form a clade.

*reticulatus jampeanus* (Auliya et al., 2002)

**Holotype:** ZFMK 73475.

**Type locality:** Tanahjampea Island, Indonesia.

**Remarks:** This subspecies was recognized by De Lang and Vogel (2006), and O’Shea (2007), but was overlooked by Henderson and Powell (2007)

(Henderson 2009, pers. comm.). However, the relevant paper was cited in the list of references by the latter authors.

***reticulatus neilsonnemani* Hoser, 2004** [synonym of *B. r. reticulatus*]

**Holotype:** FMNH 53272.

**Type locality:** Davao Province, Mindanao Island, Philippine Islands.

**Remarks:** In the diagnosis for this taxon, Hoser (2004) claimed that this taxon attains larger size and stated the same as for *B. r. dalegibbonsi* regarding the color (see remarks there). Since both are also true for the nominate form, and no further diagnostic characters are given, this taxon is placed in the synonymy of *B. r. reticulatus*.

***reticulatus patrickcouperi* Hoser, 2004** [synonym of *B. r. reticulatus*]

**Holotype:** MCZ R-25266.

**Type locality:** “Djamplong”, South Timor, Indonesia. The MCZ online collection database provides the following information on the locality: “Djamplong, S Timor Indoaustralia, Indonesia, Timor Timur?, Nusa Tenggara”.

**Remarks:** Hoser (2004) separated this subspecies from the nominate subspecies, referred to as “typical *reticulatus*”, by color, stating that this taxon is “usually a brightly coloured subspecies” (Hoser 2004). However, the author clearly stated that several color variants are known within the nominate form as well. Hoser did not provide other characters that would indicate whether the specimen is assignable to this taxon or the nominate form. The name is assigned to the synonymy of *B. r. reticulatus*.

***reticulatus saputrai* (Auliya et al., 2002)**

**Holotype:** ZFMK 73473.

**Type locality:** Selayar Island, Indonesia.

**Remarks:** Although this taxon was recognized by subsequent workers (e.g., De Lang and Vogel 2006, O’Shea 2007), it was overlooked by Henderson and Powell (2007) (Henderson 2009, pers. comm.). However, the latter authors cited the relevant work in the list of references.

***reticulatus stuartbigmorei* Hoser, 2004** [*nomen dubium*, synonym of *B. r. reticulatus*]

**Holotype:** MCZ R-8003.

**Type locality:** Buitenzore (believed a misspelling of Buitenzorg, the Dutch colonial name for Bogor), Java, Indonesia.

**Remarks:** Hoser (2004) provided characters to separate this taxon, but he attempts to distinguish this subspecies from the species “*Broghammerus reticulatus*”, which includes the subspecies itself. This taxon is indistinguishable from other subspecies based on the original description and is therefore treated as *nomen dubium* (APP5), and placed in the synonymy of the nominate form.

However, specimens from Bali, West Malaysia, Jaya, West Kalimantan, and Vietnam form a clade as demonstrated by Auliya et al. (2002).

### *timoriensis* (Peters, 1876)

#### **Synonyms:**

*Austroliasis timorensis* (Peters) – Hoser, 2000 (incorrect subsequent spelling of *Australiasis* Wells and Wellington and of *timoriensis* Peters, APP4)

*Australiasis timorensis* (Peters) – Hoser, 2004 (incorrect subsequent spelling of *timoriensis*, APP4)

*Python timorensis* (Peters) – Henderson and Powell, 2007 (incorrect subsequent spelling of *timoriensis*, APP4)

*Broghammerus timoriensis* (Peters) – Rawlings et al., 2008

**Remarks:** Doubts were casted in literature that this species occurs on Timor (e.g., Barker and Barker 1996, McDiarmid et al. 1999, O'Shea 2007) because no records other than the type specimen are known from Timor, and this reported occurrence is likely incorrect.

## Genus *Chondropython* Meyer, 1874 [synonym of *Morelia*]

**Remarks:** Hoser (2000) resurrected this genus for *viridis*, and later added two new subspecies *viridis shireenae* Hoser, 2004 and *viridis adelynhoserae* Hoser 2009 (APP8). Rawlings et al. (2008) demonstrated that two lineages (“northern” and “southern” lineage) along with the taxon *M. carinata*, form a subclade within the clade that represented *Morelia*. Although *Chondropython* is the oldest available name for this subclade, we see no advantage in resurrecting taxa as subgenera in a low-diversity genus.

### *azureus* (Meyer, 1874)

#### **Synonyms:**

*Chondropython viridis* (Schlegel, 1872) – Hoser, 2000 (part)

*Chondropython viridis viridis* (Schlegel) – Hoser, 2004 (part)

*Morelia viridis* (Schlegel) – Henderson and Powell, 2007 (part)

*Morelia azurea* (Meyer, 1874) – this paper

**Remarks:** Resurrected from the synonymy of *M. viridis* by Hoser (2009).

Rawlings and Donnellan (2003) revealed the existence of a sibling species pair within the green tree python. The authors found a genetic divergence of about 7% in mitochondrial DNA (cytochrome b gene) between the northern and southern lineages, separated by the Central Mountain Range that extends in an east-west direction through New Guinea (also see comments on *M. viridis*). Rawlings and Donnellan (2003) revealed the existence of two species, one from north of the central cordillera, the other from the south, including the Aru Island and Australian populations. Nevertheless, within the southern lineage the Australian material formed a well supported clade whereas material from Aru Island clustered with

that from Merauke and Timika. The authors state that “a determination of the species status of the northern and southern lineages awaits a more thorough assessment of divergence at nuclear genes based on wider geographic sampling than we could achieve herein with allozymes” (Rawlings and Donnellan 2003: 42). In 2008, Rawlings et al. (2008: 604) referred to the northern populations as the “unnamed sibling taxon of *M. viridis*”. However, it is not yet evident that only a single taxon occurs on Aru Island, and that the published type locality for *M. viridis* is correct. The name *azureus* Meyer 1874 would be available for the northern lineage, having its type locality on Biak Island, one of the localities from which specimens of “*M. viridis* N[orth]” were analyzed by Rawlings et al. (2008) and hence a strong candidate for the taxon name, based on priority. Since the types are presumed lost, we call for the designation of a neotype.

***viridis* Schlegel, 1872** [synonym of *M. viridis*]

***viridis adelynhoserae* Hoser, 2009** [unavailable name (APP8, see introduction)]

**Holotype:** AM R129716.

**Type locality:** Normanby Island, d’Entrecasteaux Archipelago, Milne Bay Province, Papua New Guinea.

**Remarks:** Rawlings and Donnellan (2003) revealed a genetic distance of about 3% in mitochondrial DNA (cytochrome b gene) between the Normanby Island specimen and all other specimens examined from the southern parts of New Guinea. However, this analysis was based on a single museum specimen from Normanby Island. Further research is needed to ascertain the taxonomic status of this population. However, this name is considered unavailable (APP8, also see introduction).

***viridis shireenae* Hoser, 2004** [synonym of *M. viridis*]

**Holotype:** NMV D51862.

**Type locality:** Cape York, Queensland, Australia.

**Remarks:** Hoser (2004) stated that the “white or other markings along the vertebra” are not diagnostic for this subspecies, but that “a very thin line or line of dots along the spine” is “generally a diagnostic trait for adults of this subspecies”, although the author further states, that he had seen specimens with and without such markings. Furthermore, he noticed that “vertebral markings decline with age”. With the latter comments, the author himself invalidated the utility of vertebral markings as a diagnostic character. In the absence of other characters, this taxon is apparently indistinguishable from the nominate form. Furthermore, as demonstrated by Rawlings and Donnellan (2003: 36), “all of the Australian haplotypes, which form a single lineage, are nested among the southern New Guinean haplotypes”. We therefore placed this taxon in the synonymy of *M. viridis* (see comments there).

**Genus *Heleionomus* Gray, 1842** [synonym of *Python*]**Synonyms:**

*Helionomus* Gray, 1841 (*nomen nudum*) – Hoser, 2004 (*nomen nudum* APP6)

**Remarks:** The type species for *Heleionomus* Gray, 1842 is *H. variegatus* [= *Python natalensis*]. The resurrection of the genus *Heleionomus* for *Python sebae* and *P. natalensis* is unwarranted because the actual status of *natalensis* and *sebae* has not been fully resolved and, furthermore, separation from *Python* would compromise monophyly of the genus *Python*. Rawlings et al. (2008) showed a sister-group relationship between *sebae* and *molurus* and that the genus *Python* (after exclusion of *reticulatus* and *timo-riensis*) forms a monophyletic group. This genus is therefore assigned to the synonymy of *Python*.

**Genus *Helionomus* Gray, 1842** [*nomen nudum* (APP6), incorrect subsequent spelling (APP4)]

**Remarks:** Hoser (2004) obviously intended to resurrect the genus *Heleionomus* Gray, 1842 but changed the name to “*Helionomus*”. This constitutes an incorrect subsequent spelling (Art. 33.3). However, the name *Helionomus* was already used by Gray (1841) listed in the index for Boidae, but no species was assigned to this name, and it is therefore considered a *nomen nudum*. Also see *Heleionomus*.

**Genus *Jacky python* Hoser, 2009** [unavailable name (APP8)]

**Type species:** *Python carinatus* Smith, 1980

**Remarks:** Hoser (2009) introduced this name as a subgenus of *Morelia* Gray to include the single species *Morelia carinata*.

**Genus *Katrinus* Hoser, 2000** [junior synonym of *Liasis*]

**Type species:** *Liasis fuscus* Peters, 1873

**Remarks:** Hoser (2000) established this genus for the separation of the water pythons (*L. fuscus* and *L. mackloti*) from the olive pythons (*L. olivaceus*), both currently referred to *Liasis*. He distinguished the two genera by the number of mid-body rows, stating that “*Liasis* usually has over 60” (Hoser 2000) (APP2). Barker and Barker (1994: 35) provided a range of 58–63 mid-body scale rows for *L. olivaceus barroni*. According to Rawlings et al. (2004, 2008), the taxa *fuscus* and *mackloti* are closely related to each other and since *L. mackloti* Duméril and Bibron is the name-bearing type of *Liasis* (by subsequent designation [see Stimson and McDowell (1986) and Opinion 1514, ICZN, 1988]) and because Gray (1849) had proposed the subgeneric name

*Lisalia* for *Liasis olivaceus* as well as *Simalia* (in part) for *Liasis mackloti*, the genus *Katrinus* must be considered a subjective junior synonym of *Simalia*, which itself is a synonym of *Liasis* Gray. See comments on the genus *Apodora*. Subsequent workers have not recognized *Katrinus* as a valid taxon.

***fuscus* (Peters, 1873) Hoser, 2000** [junior synonym of *Liasis fuscus*]

***fuscus cornwallisius* (Günther, 1879)** [junior synonym of *Liasis fuscus*]

**Type locality:** Dauan (as Cornwallis) Island, Torres Straits, Australia.

**Remarks:** *Katrinus cornwallisius* Günther, 1879 was resurrected from the synonymy of *L. fuscus* by Hoser (2000) for the Torres Strait islands and New Guinean populations. However, Rawlings et al. (2004) demonstrated that specimens from Queensland, the Torres Strait islands (Saibai), and New Guinea form a well-supported clade, which was considered the sister group to the clade comprising the Northern Territory and Indonesian populations. Since Queensland is the type locality of *L. fuscus* Peters, the resurrection of this name is unwarranted as it is a junior synonym to *L. fuscus*. The name *cornwallisius* is therefore placed into the synonymy of *L. fuscus*.

***fuscus jackyae* (Hoser, 2004)** [nomen dubium, synonym of *L. fuscus*]

**Holotype:** WAM R13882.

**Type locality:** Kalumburu, Western Australia.

**Remarks:** Hoser (2004) claimed that several diagnostic features separated this taxon from others, but discusses only one (APP2); he stated that “in *Katrinus fuscus fuscus* (from coastal Queensland) the upper lips are pale with a little brown peppering. However, in *K. fuscus jackyae* (from the NT and WA) the lips are usually darker with more dark brown peppering or even blotches” (Hoser 2004). He continued that this subspecies would intergrade with *K. f. cornwallisius* around the Gulf of Carpentaria. The name is herein considered a *nomen dubium* (APP5).

## Genus *Leiopython* Hubrecht, 1879

**Remarks:** Recent studies revealed that *Bothrochilus* and *Leiopython* form a clade. Thus, since Rawlings et al. (2008) considered both genera monotypic, they proposed “the use of a single generic name (*Bothrochilus*) for this species pair” (Rawlings et al. 2008: 613). Later, Schleip (2008) demonstrated that this genus is not monotypic. Rawlings et al. (2008) had used material from *L. hoserae* for their genetic analysis (GeneBank accession number U69835, Western Province, PNG at Mawatta). Until further molecular genetic data clarify the relationships of the taxa involved, and in deference to nomenclatural stability, we are reluctant to synonymize *Leiopython* with *Bothrochilus*.

***albertisii* (Peters & Doria, 1878)****Synonym:**

*Leiopython albertisii barkeri* Hoser, 2000 (*nomen nudum*, APP6, see below)

*Bothrochilus albertisii* (Peters & Doria) – Rawlings et al., 2008

*Leiopython albertisi barkerorum* Hoser – Hoser, 2009 (unavailable name, APP8)

**Distribution:** Mulyadi (2007) reported the occurrence of *L. albertisii* from Lopintol (Waigeo) and Schleip (2008) from Emirau Island, St. Matthias Group, Bismarck Archipelago, New Ireland Province, Papua New Guinea.

**Remarks:** Henderson and Powell (2007) listed only *Leiopython albertisii* Peters & Doria, 1878. Hoser (2000) incorrectly ascribed *albertisii* to Gray 1842. The taxon was named in honor of Italian naturalist Luigi Maria D'Albertis, who made a name for himself in New Guinea. D'Albertis was only a few months old in 1842 and would, therefore, have been an unlikely recipient of Gray's dedication. Furthermore, Hoser repeatedly used an incorrect spelling for the species *albertisii* by omitting the terminal *-i* (APP4, article 33.4).

***albertisii barkeri* Hoser, 2000** [*nomen nudum* (APP6)]**Synonyms:**

*Leiopython albertisi barkerorum* Hoser, 2009 (APP4, APP8, see introduction)

**Remarks:** Hoser (2000) differentiated this subspecies only by remote distribution (APP2). Other characters mentioned by Hoser (2000) were said to overlap with the nominate form. Wüster et al. (2001) and Schleip (2008) therefore considered the name a *nomen nudum*. Furthermore, since the name honours two persons, it should have been suffixed with *-orum*. In 2009 Hoser re-described this taxon with the name emended to *albertisi barkerorum*. However, the name is considered not published under the Code (APP8).

***bennettorum* Hoser, 2000** (name emended by Wüster et al. 2001)**Synonyms:**

*Leiopython albertisii bennetti* Hoser, 2000

*Leiopython bennettorum* Hoser – Schleip, 2008 (name emended)

**Holotype:** BPBM 5452.

**Type locality:** near Wau, Morobe Province, Papua New Guinea.

**Remarks:** The original spelling *bennetti* (Hoser 2000) was emended (Wüster et al. 2001, Schleip 2008) because the taxon honours two persons (Art. 31.1.2, ICBN 1999) and should have been suffixed with *-orum*, a correction proposed by Wüster et al. (2001) and subsequently corrected by Schleip (2008).

***biakensis* Schleip, 2008**

**Holotype:** RMNH 10193.

**Type locality:** Biak Island.

***fredparkeri* Schleip, 2008**

**Holotype:** CAS 118906.

**Type locality:** Karimui, Simbu Province, Papua New Guinea.

***hoserae* Hoser, 2000**

**Synonyms:**

*Leiopython albertisii* (Peters & Doria) – Henderson and Powell, 2007

*Leiopython hoserae* Hoser – Schleip, 2008

**Holotype:** AMNH R-107150.

**Type locality:** Wipim, Western Province, Papua New Guinea.

***huonensis* Schleip, 2008**

**Holotype:** AMNH R-95535.

**Type locality:** Lae, Huon Peninsula, Morobe Province, Papua New Guinea.

**Genus *Lenhoserus* Hoser, 2000** [synonym of *Morelia*]

**Type species:** *Python boeleni* Brongersma, 1953.

**Remarks:** Hoser (2000) established this monotypic genus for *Morelia boeleni* stating “while the Boelen’s Python (*boeleni*) has close affinities with the carpet pythons, there is no evidence before this author to suggest that the relationship is any closer than that between the Green (*viridis*) and carpets. Thus if *viridis* is entitled to be placed in a separate genus to the carpets, so too should be *boeleni*” (Hoser 2000: 21–22). Rawlings et al. (2008) supported monophyly of the genus *Morelia* including *M. boeleni*. *Lenhoserus* would therefore only be a subgenus within *Morelia*. Other authors have not adopted this name, and, in adherence to nomenclatural stability, we regard *Lenhoserus* as a subjective junior synonym of *Morelia* (see comments there).

**Genus *Liasis* Gray, 1842**

**Synonyms:**

*Katrinus* Hoser, 2000

**Remarks:** Scanlon and Mackness (2002) considered the gender of *Liasis* Gray feminine because Gray’s (1842) original use of the combination *Liasis olivacea* implied it to be feminine. However, Gray (1842) also used the masculine gender for *Liasis amethystinus* [= *Morelia amethystina* (Schneider)] within *Liasis*. Hence, Gray did not clearly indicate his intentions concerning the gender of *Liasis*. Despite this discordance in gender, the ICZN had used its plenary power (Art. 81.1, ICZN, 1999) to fix a type species for *Liasis* (Opinion 1514, ICZN 1988), and additionally (but perhaps not deliberately) fixed the gender as masculine. The name and gender also entered the List of Available Names in Zoology (also see Art. 80.6, 80.7, ICZN

1999). These authors therefore follow the predominant use of a masculine gender for *Liasis*.

### ***dubudingala* Scanlon & Mackness, 2002 [extinct species]**

#### **Synonyms:**

?*Morelia* sp. – Archer and Wade 1976

**Holotype:** QMF 9132, mid-trunk vertebra.

**Type locality:** Main Quarry, Allingham Formation (early Pliocene), Bluff Downs Station, northeastern Queensland.

**Remarks:** Scanlon and Mackness (2002: 433) stated that “the limited number of characters identified here for pythonine vertebrae thus imply a position either within, or as a sister taxon to, *Liasis* (*sensu stricto*)”.

### ***fuscus* Peters, 1873**

#### **Synonyms:**

*Katrinus fuscus* (Peters) – Hoser, 2000

*Liasis fuscus* Peters – Rawlings et al., 2004; Henderson and Powell, 2007

*Katrinus fuscus fuscus* (Peters) – Hoser, 2000

*Katrinus fuscus cornwallisius* (Günther, 1879) – Hoser, 2000

**Remarks:** Kluge (1993) synonymized *Liasis fuscus* Peters, 1873 with *Liasis mackloti* Duméril and Bibron, 1844. However, Rawlings et al. (2004) demonstrated that specimens from Queensland (the type locality of this taxon), the Torres Strait islands (Saibai), and New Guinea form a well-supported clade, which is considered the sister group to the clade comprising the Northern Territory and Indonesian populations. Also see comments on *Katrinus*. Henderson and Powell (2007) did not recognize any subspecies within *L. fuscus*, a position followed herein. Some authors refer to this taxon as *L. mackloti* Duméril and Bibron (e.g., Hay 2007).

### ***mackloti* (Duméril & Bibron, 1844)**

#### **Synonyms:**

*Katrinus mackloti* (Duméril & Bibron, 1844) – Hoser, 2000

*Liasis mackloti* Duméril & Bibron – Rawlings et al., 2004; Henderson and Powell, 2007

**Remarks:** Hoser (2000) placed this species in his genus *Katrinus* (see comments there). The recognition of the subspecies *L. m. dunni* and *L. m. savuensis* is supported by Rawlings et al. (2004). Carmichael et al. (2007) provide additional evidence (different courtship behaviors and pheromone trailing) for this placement. See the latter citation for additional information on biogeography.

***mackloti mackloti* (Duméril & Bibron, 1844)**

**Synonyms:**

*Katrinus mackloti mackloti* (Duméril & Bibron) – Hoser, 2000

*Liasis mackloti mackloti* Duméril & Bibron – Rawlings et al., 2004; Henderson and Powell, 2007

***mackloti dunni* Stull, 1932**

**Synonyms:**

*Katrinus mackloti dunni* (Stull) – Hoser, 2000

*Liasis mackloti dunni* Stull – Rawlings et al., 2004; Henderson and Powell, 2007.

**Remarks:** Carmichael et al. (2007) note that sexual dimorphism is found among Macklot's pythons but it is different from *L. m. mackloti* and *L. m. savuensis*; in *L. m. dunni* males are larger than females and engage in male-male combat.

***mackloti savuensis* (Brongersma, 1956)**

**Synonyms:**

*Katrinus savuensis* (Brongersma) – Hoser, 2000

*Liasis mackloti savuensis* Brongersma – Rawlings et al., 2004; Henderson and Powell, 2007

**Remarks:** Referred to as *L. savuensis* by some authors (Hoser 2000, Vidal et al. 2007).

***olivaceus* Gray, 1842**

**Synonyms:**

*Liasis olivacea* Gray, 1842 – Gray, 1842

*Morelia antiqua* (Smith & Plane, 1985) – Kluge, 1993

*Liasis olivacea* Gray, 1842 – Scanlon and Mackness, 2002 (see remarks at *Liasis*)

**Remarks:** We accept the subspecies proposed by Smith (1981) and supported by molecular genetic evidence from Rawlings et al. (2004).

***olivaceus olivaceus* Gray, 1842**

***olivaceus barroni* LA Smith, 1981**

**Genus *Montypythonoides* Smith & Plane, 1985** [subjective junior synonym of *Morelia*]

**Type species:** *Montypythonoides riversleighensis* Smith & Plane, 1985 [extinct species]

**Remarks:** Smith and Plane (1985: 194) stated that this genus "...shows strong relationship with species of *Morelia*". Also see *Morelia riversleighensis*.

## Genus *Morelia* Gray, 1842

### Synonyms:

*Lenhoserus* Hoser, 2000

*Chondropython* Meyer, 1874 – Hoser, 2000

*Nyctophilopthon* Wells & Wellington, 1985 – Hoser, 2000

*Montypythonoides* Smith & Plane, 1985 – Scanlon, 2001

*Australiasis* Wells & Wellington, 1984 – Hoser, 2004

**Remarks:** Hoser (2000) proposed the splitting of this genus into several genera. He created a new genus, *Lenhoserus* Hoser (see comments there) (for *M. boeleni*), and resurrected *Australiasis* Wells & Wellington (for *M. amethystina* and *B. timoriensis*), but created an unavailable name (APP6) (“*Austroliasis*”) by incorrect subsequent spelling (APP4). Later, Hoser (2004) used the correct spelling *Australiasis* Wells & Wellington, added the species recognized by Harvey et al. (2000) and additionally resurrected the taxon *duceboracensis* Günther 1879 (see comments there). Furthermore, he resurrected *Chondropython* Meyer 1874 (for *M. viridis*) and *Nyctophilopthon* Wells & Wellington (for *M. oenpelliensis*). However, phylogenetic studies (Rawlings et al. 2008) revealed that this taxonomic action is unwarranted. Although Rawlings et al.’s (2008) maximum parsimony analysis showed *Morelia* to be diphyletic (but monophyletic in Bayesian analysis), the separation of the *amethystina*-complex (*sensu* Harvey et al. 2000) and of *oenpelliensis* from the *bredili*/*spilota*-clade would in any case be unwarranted and would nullify the monophyly of this grouping. The resurrection of *Chondropython* would only be warranted at subgeneric rank with the inclusion of the two recognized lineages of the green tree python (*sensu* Rawlings and Donnellan, 2003) and of *M. carinata*. However, Rawlings and Donnellan (2003) and Rawlings et al. (2008) avoided such placement because the phylogeny was not fully resolved (see comments for *Chondropython azureus*). The placement of *M. boeleni* as a separate monotypic genus is also unwarranted. We do not see any value in dividing such a small genus, and in the interests of nomenclatural stability, we place *Australiasis*, *Lenhoserus*, *Chondropython*, and *Nyctophilopthon* in the synonymy of *Morelia*.

### *amethystina* (Schneider, 1801)

#### Synonyms:

*Austroliasis amethystina* (Schneider) – Hoser, 2000 (incorrect subsequent spelling, APP4)

*Australiasis amethystina* (Schneider) – Hoser, 2004

*Australiasis amethystina clarki* (Barbour, 1914) – Hoser, 2004

*Australiasis duceboracensis* (Günther 1879) – Hoser, 2004

*Australiasis amethystina* (Scheider) – Hoser, 2009 (APP8, see introduction)

*Australiasis dipsadides* (Ogilby, 1891) – Hoser, 2009 (APP8, see introduction)

**Distribution:** Kraus and Allison (2004) reported *M. amethystina* from Ferguson Island.

**Remarks:** Harvey et al. (2000) identified three races within the species, two from the mainland of New Guinea, separated by the Central Mountain Range

(also see remarks on *M. clarki*), and another race from New Ireland (see remarks on *M. duceborensis*). This is consistent with other species found in this region (e.g., the two lineages of the green tree python (*sensu* Rawlings and Donnelan, 2003), and *L. albertisii/L. hoserae*). According to Harvey et al. (2000), the holotype of *A. amethystina* is lost. We call for the designation of a neotype.

***antiqua* (Smith & Plane, 1985)** [synonym of *Morelia riversleighensis*, extinct species]

**Synonyms:**

*Morelia antiquus* Smith & Plane, 1985 – Smith and Plane, 1985

*Morelia antiqua* – Scanlon, 1992 (*antiquus* amended for gender by Scanlon 1992)

*Liasis olivacea* Gray, 1842 – Kluge, 1993

**Holotype:** Commonwealth Paleontological Collection 25077 (not “20577”; see Scanlon 2001), right dentary.

**Type locality:** Camfield Beds, Blast Site, Bullock Creek, Northern Territory, Australia. Late middle Miocene (Scanlon 2001).

***riversleighensis* (Smith & Plane, 1985) – Scanlon, 2001**

**Remarks:** Smith and Plane (1985) documented significantly lesser curvature in the teeth of this taxon, to that found in species of the genera *Python* and *Morelia*, and because “...of the slight curvature of the dentary teeth...” (Smith and Plane 1985: 194) the authors considered this taxon more closely related to *Morelia* than to *Python*.

***azurea* (Meyer, 1874)**

**Remarks:** See Comments on *Chondropython azureus* and *Morelia viridis*.

***boeleni* (Brongersma, 1953)**

**Synonyms:**

*Lenhoserus boeleni* (Brongersma) – Hosier, 2000

*Morelia boeleni* (Brongersma) – Henderson and Powell, 2007; Flagle and Stoops, 2009

**Remarks:** Austin et al. (2009) found little genetic divergence within specimens across the species’ range. A single specimen out of 98 examined using the cytochrome b gene, from the eastern Morobe Province, PNG showed about 1.1% genetic divergence from specimens from West Papua. This demonstrates reduced genetic diversity within this taxon.

***bredli* (Gow, 1981)**

**Remarks:** Fyfe (2007) lists this species as subspecies *M. spilota bredli*.

***carinata* (Smith, 1981)**

***clastolepis* Harvey et al., 2000****Synonyms:**

*Australiasis clastolepis* (Harvey et al.) – Hoser, 2004, 2009 (APP8, see introduction)

*Morelia clastolepis* Harvey et al. – Henderson and Powell, 2007

**Holotype:** UTA 44486.

**Type locality:** Ambon, Maluku (= Moluccas), Indonesia.

***kinghorni* Stull, 1933**

**Distribution:** For range extensions in Queensland see Augusteyn (2004) and Fearn and Trembath (2006).

***macburniei* Hoser, 2004 [synonym of *M. s. imbricata*]**

**Holotype:** SAMA R13994.

**Type locality:** St. Francis Island, South Australia.

**Remarks:** Hoser (2004) separated this taxon from its closest relative *M. s. imbricata* (see Schwaner et al. 1988) on the ground of “higher incidence of scale anomalies” to the ventral scales. It can be argued that anomalies do not make good diagnostic characters, and these anomalies were already described in detail by Schwaner et al. (1988). Hoser (2004) further claims that this taxon may be distinguished from *M. mippughae* “by having lanceolate-shaped dorsal scales as opposed to more rhomboidal-shaped dorsal scales” (also see comments on *M. mippughae*). According to Schwaner et al. (1988: 15), and in support of Smith (1981), “specimens of *imbricata* have distinctly elongated, lanceolate-shaped, posterior dorsal scales. *M. s. variegata* usually have the rhomboidal condition”. Furthermore, Schwaner et al. (1988) also reported that specimens from the St. Francis Island exhibited reduced ventral and subcaudal scale counts and a shorter tail than specimens from other populations. Hoser (2004) stated that this taxon is distinguishable from “all other *Morelia* by colouration and patterns” (Hoser 2004), but contradicted this statement when stating that this taxon is “highly variable in individual colouration and pattern”, and that “this species cannot be definitively separated from other *Morelia* on the basis of scalation alone as these properties (ventral counts and the like) may overlap with other *Morelia*” (Hoser 2004). Based on this description, it is unlikely that specimens can be correctly assigned to this species unless they were known to originate from the type locality. Schwaner et al. (1988: 14) and Pearson et al. (2002) assigned the St. Francis Island population to the subspecies *M. s. imbricata*. We concur with this and relegate this taxon to the synonymy of *M. s. imbricata*. Mense (2006), Henderson and Powell (2007), and Swan (2007) did not list this taxon.

***mippughae* Hoser, 2004 [nomen dubium (APP5)]**

**Holotype:** SAMA R14261.

**Type locality:** Iron Duchess, Middleback Ranges, South Australia.

**Remarks:** Hoser (2004) separated this taxon from its relative *M. macburniei* “by a lower incidence of scale anomalies” (Hoser 2004) of the ventral scales. This is meaningless because most populations will show few anomalies, hence, using the “normal state” as a character does not differentiate this taxon from others. Hoser (2004) continued that this taxon has “more rhomboidal-shaped dorsal scales as opposed to having lanceolate-shaped dorsal scales” (Hoser 2004), which is, according to Schwaner et al. (1988) also true for *M. s. variegata* (also see remarks on *M. macburniei*). It is further separated from its closest relative *M. s. metcalfei* by its color pattern and from all other *Morelia* by coloration and patterning. Hoser claimed that “a suite of characteristics” separate this taxon from its closest relatives *M. macburniei* and *M. metcalfei*, but failed to enumerate characters other than those cited above. Hence, the name cannot clearly be assigned to a specimen and this name is therefore considered a *nomen dubium* (APP5). Mense (2006), Henderson and Powell (2007), and Swan (2007) did not list this taxon.

### *nauta* Harvey et al., 2000

#### Synonyms:

*Australiasis nauta* (Harvey et al.) – Hoser, 2004, 2009 (APP8, see introduction)

*Morelia nauta* Harvey et al. – Henderson and Powell, 2007

**Holotype:** UTA 44482.

**Type locality:** Yamdena Island, Tanimbar Island Group, Maluku (=Moluccas), Indonesia.

### *oenpelliensis* (Gow, 1977)

#### Synonyms:

*Nyctophilopthon oenpelliensis* (Gow) – Hoser, 2000

*Morelia oenpelliensis* Gow – Henderson and Powell, 2007

### *riversleighensis* (Smith & Plane, 1985) [extinct species]

#### Synonyms:

*Montypythonoides riversleighensis* – Smith and Plane 1985

*Morelia spilota* (Lacépède) – Kluge, 1993

*Morelia antiqua* Smith & Plane, 1985 – Scanlon, 2001

*Morelia riversleighensis* – Scanlon 2001

**Holotype:** QM F 12926 (=AR4058), incomplete right maxilla.

**Type locality:** Henk’s Hollow Local Fauna, Tertiary System C, approximately 3.6 km southwest of Tedford’s (1967) Site B, Riversleigh, northwestern Queensland, Australia. Late Oligocene - early middle Miocene (Scanlon 2001).

**Remarks:** Smith and Plane (1985) described the two extinct species *riversleighensis* and *antiquus* from Australia. Kluge (1993) synonymized *antiqua* (name amended for gender by Scanlon 1992) with *olivaceus* Gray due to the lack of auta-

pomorphies and great overall similarity and *riversleighensis* with *spilota* Lacépède. Scanlon (2001) synonymized *antiqua* with *riversleighensis*.

### *spilota* (Lacépède, 1804)

#### **Synonyms:**

*Morelia riversleighensis* (Smith & Plane, 1985) – Kluge, 1993 (part)

**Remarks:** Hoser (2000, 2004) listed several subspecies of *M. spilota* at specific rank, without comment. Since no new evidence is available, these authors continue to treat them all as subspecies. These authors also treat the taxon *M. harrisoni* described by Hoser (2000) as a subspecies of *M. spilota* (see comments there).

### *spilota spilota* (Lacépède, 1804)

### *spilota cheynei* Wells & Wellington, 1984

#### *spilota harrisoni* Hoser, 2000 [subspecies inquirenda, APP7]

**Holotype:** AMNH R-82433.

**Type locality:** Port Moresby, Central Province, Papua New Guinea.

**Remarks:** Hoser (2000: 24) described this taxon at specific rank but considered it “similar in most respects to the others in the genus *Morelia*” separating it from *M. s. cheynei*, *M. s. variegata*, and *M. s. mcdowelli* “by distribution” (APP1, APP2), and further stating that specimens of this taxon “tend to have a lower average ventral and subcaudal scale count than *Morelia cheynei*, *Morelia variegata* and *Morelia macdowelli*, however the sample seen is too small to conclude if this trend is general” (Hoser 2000: 25). Hoser’s concept of this taxon comprises several populations throughout New Guinea. The author referred to Barker and Barker (1999) for further diagnostic characters. Barker and Barker identified several different and distinct populations from New Guinea, which Hoser (2000) placed within this catch-all taxon. For the “Port Moresby” population Barker and Barker (1999) stated that they “exhibit some characteristics of both *variegata* and *mcdowelli* (...). Most Port Moresby carpets have longitudinally expanded lateral pale blotches and bold facial stripes from the eye to the nasal scale, as do *mcdowelli* in northern Queensland. The patterns on the tops of the heads are similar to *variegata*”. For the “Irian Jaya” (now West Papuan or Papuan) population they stated that “[a]t 2 and 3 years of age, some are even as black and gold as *M. s. cheynei*”, but did not provide further information on the “Trans-fly” (PNG) or the “Northern New Guinea” populations. Hoser (2000: 25) finally stated that “*Morelia harrisoni* can best be definitively separated from the other species of *Morelia* by DNA analysis” (APP2). To the authors’s best knowledge, no such analysis has been carried out. Since the diagnostic characters provided by Hoser (2000) and by Barker and Barker (1999) overlap with those for other taxa of the *Morelia spilota* complex, this taxon is

likely to be confused with them. We consider this taxon a *subspecies inquirenda* (APP7). Henderson and Powell (2007) did not recognize this taxon. Mense (2006) discussed this taxon as a subspecies of *M. spilota*, and O’Shea (2007: 134) wrote: “Papuan Carpet Python *Morelia spilota* ssp. The status of all New Guinea Carpet Pythons is controversial (...). The New Guinea populations are fragmented and isolated, and their taxonomic status and relationships have yet to be determined with certainty”. Until further research has established otherwise, these authors treat this taxon as a subspecies of *M. spilota*, as proposed by Mense (2006) and Flagle and Stoops (2009).

***spilota imbricata* LA Smith, 1981**

**Synonyms:**

*Morelia macburnieei* Hoser, 2004

***spilota mcdowelli* Wells & Wellington, 1984**

***spilota metcalfei* Wells & Wellington, 1985**

***spilota variegata* Gray, 1842**

**Remarks:** Prior to Wells and Wellington (1984, 1985), this name comprised all the taxa now recognized at subspecific rank, excluding the nominate subspecies and *M. s. imbricata*, but including the New Guinean populations. Now *M. s. variegata* is taxonomically restricted to Northern Australia (Kend 1997, Mense 2006).

***tracyae* Harvey et al., 2000**

**Synonyms:**

*Australiasis tracyae* (Harvey et al.) – Hoser, 2004, 2009 (APP8, see introduction)

*Morelia tracyae* Harvey et al. – Henderson and Powell, 2007

**Holotype:** UTA 44473.

**Type locality:** Tobelo, Halmahera, Maluku (=Moluccas), Indonesia.

***viridis* (Schlegel, 1872)**

**Synonyms:**

*Chondropython viridis* (Schlegel) – Hoser, 2000 (part)

*Chondropython viridis viridis* (Schlegel) – Hoser, 2004 (part)

*Chondropython viridis shireenae* Hoser, 2004

*Morelia viridis* (Schlegel) – Henderson and Powell, 2007

**Distribution:** see Wilson and Heinsohn (2007)

**Remarks:** Rawlings and Donnellan (2003) found molecular evidence for cryptic diversity within *M. viridis*, resulting in two genetically distinct races. The type locality for *M. viridis* is Aru Island, which applies to the “southern lineage”,

including Australian specimens (Rawlings and Donnellan 2003) (also see *Chondropython azureus*). However, Rawlings and Donnellan (2003: 42) noted that “(...) the east/west limits of the distribution of the two lineages may not necessarily be at the extreme ends of the central cordillera or the island”, and hence, there may be even more lineages present. Finally, due to the absence of molecular genetic data from the holotype, the type locality Aru Island cannot definitely be confirmed.

## Genus *Python* Daudin, 1803

### Synonyms:

*Aspidoboa* Sauvage, 1884 – Hoser, 2004

*Helionomus* Gray – Hoser 2004 (incorrect subsequent spelling, APP4)

*Shireenhoserus* Hoser, 2004 (junior synonym of *Enygrus* Wagler)

**Distribution:** Head (2005) reported remains of an indeterminate python from Miocene-age strata of the Siwalik Group of Pakistan. From the known distribution of extant species, this is likely to be a species of *Python*.

**Remarks:** Hoser (2004) split this genus into several genera, e.g., *Aspidoboa* Sauvage (for *breitensteini*, *brongersmai*, and *curtus*), *Broghammerus* Hoser (for *reticulatus*), and *Shireenhoserus* Hoser (for *anchietae* and *regius*). However, Hoser (2004) overlooked *Enygrus* Wagler, 1830 (also see McDowell 1979: 9–10, 28), which makes *Shireenhoserus* a subjective junior synonym of *Enygrus* Wagler. He further intended to resurrect *Heleionomus* Gray, 1842 (for *sebae* and *natalensis*) but spelt the name as “*Helionomus*”. This constitutes an incorrect subsequent spelling (APP4), although the name *Helionomus* was already listed in Gray 1841 but is considered a *nomen nudum* (see remarks for *Heleionomus*). Only *molurus* and *bivittatus* would have remained within *Python*. Evidence from genetic studies reveal that with the exception of *reticulatus* and *timoriensis*, which were placed into *Broghammerus* (see comments there) by Rawlings et al. (2008), no further splitting of the clade *Python* is indicated. Furthermore, the phylogenetic relationships of several species (e.g., *regius* and *anchietae*, *molurus* and *bivittatus*, and *sebae* and *natalensis*) have not been fully resolved (e.g., Douglas et al. 2010: fig. 4–6). Other groups (e.g. the *curtus*-group *sensu lato*) are currently under study.

### *anchietae* Bocage, 1887

#### Synonyms:

*Shireenhoserus anchietae* (Bocage) – Hoser, 2004 (junior synonym of *Enygrus* Wagler).

*Python anchietae* Bocage – Henderson and Powell, 2007

### *bivittatus* (Kuhl, 1820)

**Distribution:** See Greene et al. (2007), Snow et al. (2007), Pyron et al. (2008), and Barker and Barker (2009) for notes on introduced populations in Florida, USA. For distribution in Nepal, see O’Shea (1998), for distribution in Asia see

Pauwels et al. (2003), Barker and Barker (2008, 2010). Barker and Barker (2010) considered records of the occurrence of *bivittatus* in the Sichuan Province deviant due to complete isolation from the natural range of *bivittatus* and therefore excluded the province from the range of occurrence. Records from Sumatra and Borneo are believed to be incorrectly identified (Haile 1958, Groombridge and Luxmoore 1991).

**Remarks:** Jacobs et al. (2009) considered this taxon a valid species. Evidence for this placement was already provided by O'Shea (1998, 2007) and Barker and Barker (2008) who pointed out that isolated populations of *bivittatus* do exist within the distributional range of *molurus* along the southern Nepalese border and in north-east India as reported from Assam by O'Shea (2007). Jacobs et al. (2009) primarily referred to Barker and Barker (2008) when stating that the isolated populations appear to exist not only sympatrically but syntopically with *molurus* but maintain their own integrity by avoiding interbreeding. However, O'Shea (pers. obs.) has observed the species inhabiting different habitats. *P. molurus* appears to occur in dry sandy woodland whereas *bivittatus* prefers riverine forests and flooded grasslands. O'Shea had not observed the two species occurring sympatrically or syntopically. Jacobs et al. (2009: 12) stated that de Rooij (1917) had assumed the type locality of Kuhl's (1820) concept of *bivittatus*, which was based on unverified pictures by Seba, to be in Indochina rather than in the Sundaland and that the populations occurring between China and Java may be considered *P. molurus sondaica* (sic) Werner, 1899. Nevertheless, according to Jacobson et al (2009), Mertens (1930) fixed the type locality to Java without the designation of a neotype, which has led to nomenclatural problems. Mertens (1930) as well as Werner (1909, 1930) and Pope (1935) assumed that Schlegel (1837) rather than Kuhl (1820) had introduced the name *bivittatus*. According to Jacobs et al. (2009), Mertens (1930) was aware that Schlegel's (1837) composite concept of *P. bivittatus* included several python taxa, namely those from India (*P. molurus*) and from Africa (*P. sebae*), respectively.

### *bivittatus bivittatus* (Kuhl, 1820)

#### *bivittatus progschaei* Jacobs et al., 2009 [subspecies inquirenda, APP7]

**Holotype:** ZFMK 87481, subadult male from SW-Sulawesi.

**Type locality:** Known only from the southwest of Sulawesi.

**Remarks:** Jacobs et al. (2009) separated this subspecies from the nominate form by its generally smaller size (up to 240 cm in TL), up to 50% smaller egg size, and the smaller size of the neonates as well as by slightly different patterning and scale counts.

### *breitensteini* Steindachner, 1880

#### **Synonyms:**

*Python breitensteini* Steindachner – Keogh et al., 2001

*Aspidoboa breitensteini* (Steindachner) – Hoser, 2004  
*Python breitensteini* Steindachner – Henderson and Powell, 2007  
**Remarks:** Elevated to specific rank by Keogh et al. (2001).

***brongersmai* Stull, 1938**

**Synonyms:**

*Python brongersmai* Stull – Keogh et al., 2001  
*Aspidoboa brongersmai* (Stull) – Hoser, 2004  
*Python brongersmai* Stull – Henderson and Powell, 2007  
**Remarks:** Elevated to specific rank by Keogh et al. (2001).

***curtus* Schlegel, 1872**

**Synonyms:**

*Python curtus* Schlegel – Keogh et al., 2001  
*Aspidoboa curtus* (Schlegel) – Hoser, 2004  
*Python curtus* Schlegel – Henderson and Powell, 2007  
**Remarks:** Elevated to specific rank by Keogh et al. (2001).

***euboicus* Römer, 1870** [extinct species, considered *nomen dubium* by Rage 1984]

**Synonyms:**

*Python Euboicus* Römer, 1870  
*Heteropthon euboicus* (Römer) – de Rochebrune, 1880  
*Heteropthon euboicus* (Römer) – Kuhn, 1939, 1963  
*Python euboicus* Römer – Rage, 1984

**Holotype:** Fragment of the trunk portion of the vertebral column (25 vertebrae and ribs), left dentary. No accession number. According to Szyndlar (1991) the holotype is probably lost.

**Type locality:** Kimi (Euboea, Greece), early Miocene (MN ?3).

**Remarks:** See Szyndlar (1991) and Szyndlar and Rage (2003: 67–68) for further information.

***europaeus* Szyndlar & Rage, 2003** [extinct species]

**Synonyms:**

*Python* sp. – Rage 1982; Ivanov 2000, 2002  
*Python europaeus* Szyndlar & Rage, 2003

**Holotype:** MNHN, VCO 29. One trunk vertebra.

**Type locality:** Vieux Collonges (=Mont Ceindre), France, early/middle Miocene (MN 4/5).

**Remarks:** See Szyndlar and Rage (2003: 68–72), and Rage and Bailon (2005: 427–428) for further information.

***molurus* (Linnaeus, 1758)**

***molurus molurus* (Linnaeus, 1758)**

***molurus pimbura* (Deraniyagala, 1945) [subspecies inquirenda, APP7]**

**Synonyms:**

- Python molurus molurus* (Linnaeus) (part)
- Python molurus molurus* – Constable, 1949
- Python molurus pimbura* – Deraniyagala, 1955
- Python molurus molurus* – Stimson, 1969

**Distribution:** First reported from Nunavil (Thenmarachi), Jaffna Peninsula, Sri Lanka by Abyerami and Sivashanthini (2008).

**Remarks:** Hoser (2004) resurrected this taxon from the synonymy of *P. m. molurus* without providing reasons for this action. Deraniyagala (1945) separated the subspecies from *P. m. molurus* based on lower subcaudal scale counts and the irregular shape of the lateral markings. Dorsal midbody scale rows and ventral scale counts overlap those of the nominate subspecies. Constable (1949: 124) did not follow this placement and synonymized this taxon with the nominate subspecies, which was followed by Stimson (1969). A second paper by Deraniyagala (1955: 6) provided a more detailed description of the subspecies. Therein, he stated that this taxon is also separated from the nominate form “in generally possessing three preoculars instead of two” or four as stated by Wall (1921: 47) for some Indian populations of the nominate form. There appears to be a range in preocular scale counts across India, from three in the northeast, to four in the north-center, and two in northwest (O’Shea pers. obs.) but this data, from only a few specimens, requires further verification. Contrary to his findings in 1945, Deraniyagala (1955) reports this taxon to have “more subcaudals” than the nominate form, obviously a typographic error according to the scale count data provided therein. It seems likely that subsequent workers overlooked this latter work, since neither Stimson (1969) nor McDiarmid et al. (1999) or Henderson and Powell (2007) cited it. Several subsequent workers accepted the placement to the synonymy of the nominate form, but no further studies have been conducted on the *molurus*-complex. However, besides the lower subcaudal scale counts and the higher number of preoculars, the pink surface of the head may also constitute a morphological difference. Boulenger (1890, 1893) and MA Smith (1943) recorded two preoculars for *Python molurus*, while Wall (1921) records three preoculars for specimens from Ceylon. Since Sri Lanka is a known biodiversity hot spot with a high level of endemism, this allopatric population may represent a cryptic species. Because of the evidence provided by Deraniyagala (1955), these authors tentatively list this taxon as a valid subspecies and call for further research regarding its true status (APP7).

***natalensis* A Smith, 1840****Synonyms:**

*Python natalensis* A Smith – Broadley, 1999

*Helionomus natalensis* (A Smith) – Hoser, 2004 (*nomen nudum*, also see remarks on *Python*)

*Python natalensis* A Smith – Henderson and Powell, 2007

**Distribution:** Notes on the distribution of this species can be found in Alexander (2007).

**Remarks:** McDiarmid et al. (1999) refer to A. Smith 1833. According to Branch and Bauer (2005), the name “*Python Natalensis*” already appeared in A. Smith (1833) as well as in A. Smith (1838) but without a description. The name appeared again in A. Smith (1840), but this time was accompanied by a plate. Gray (1842) also cites A. Smith (1840) as do Branch and Bauer (2005). Elevated to specific rank by Broadley (1999).

***regius* (Shaw, 1802)****Synonyms:**

*Shireenhoserus regia* (Shaw) – Hoser, 2004 (junior synonym of *Enygrus* Wagler).

*Python regius* (Shaw) – Henderson and Powell, 2007

**Remarks:** For notes on the natural history and distribution of this species, see Barker and Barker (2006).

***sardus* (Portis, 1901) [extinct species, *nomen dubium*]****Synonyms:**

*Paleopython sardus* – Portis, 1901

*Paleryx sardus* (Portis) – Kuhn, 1963

?*Python sardus* (Portis) – Rage, 1984

**Holotype:** Articulated palatine and anterior pterygoid fragment (not traced).

**Type locality:** Monte Albu (=Alba?)(Sardinia) Italy, middle Miocene (MN 6 or 7+8).

**Remarks:** Szyndlar and Rage (2003: 72–73) considered this name a *nomen dubium* as it is indistinguishable from other (extinct) *Python*.

***sebae* (Gmelin, 1788)****Synonyms:**

*Helionomus sebae* (Gmelin) – Hoser, 2004 (*nomen nudum*, also see remarks on *Python*)

*Python sebae* (Gmelin) – Henderson and Powell, 2007

**Remarks:** Elevated to specific rank by Broadley (1999).

**Genus *Rawlingspython* Hoser, 2009** [unavailable name (APP8)]

**Type species:** *Liasis perthensis* Stull, 1932

**Remarks:** Hoser (2009) introduced this name as a monotypic subgenus of *Antaresia* Wells and Wellington 1984.

**Genus *Shireenhoserus* Hoser, 2004** [subjective junior synonym of *Python* and subjective junior synonym of *Enygrus* Wagler]

**Type species:** *Python anchietae* Bocage, 1887

**Remarks:** Hoser (2004) established this genus for the smaller African taxa *P. anchietae* and *P. regius*. Hoser (2004) overlooked the older name *Enygrus* Wagler, 1830 (see remarks under *Python*), relegating *Shireenhoserus* as a junior synonym. Moreover, after relocation of the two Asian taxa *reticulatus* and *timoriensis* the genus *Python* now forms a clade, including *P. regius*. The phylogenetic relationship between *P. regius* and *P. anchietae* has not yet been examined and separation would result in non-monophyly. Hence, the recognition of this genus is unwarranted and it is assigned to the synonymy of *Python*.

## Discussion and Conclusion

In taxonomy, there have always been “lumpers” and “splitters”, but neither trend is helpful when taken to the extreme. “Splitters” could easily achieve monophyly by placing every single species in its own monotypic genus. Equally, lumping all taxa together into large unmanageable genera may obscure phylogenetic relationships and evolutionary diversity. Thus, a well-balanced “middle-ground” between “lumping” and “splitting” based on scientific evidence is the most desirable approach. In truth, Pythonidae is a relatively small family currently containing 40 extant species in nine genera, as defined here, yet it has been the subject of unprecedented attention by both professional and amateur taxonomists resulting in both papers that clarify and papers that confuse the phylogenetic relationships within the family. Whereas some subspecies may be recognized, erecting additional monotypic genera and creating subgenera within small genera is unwarranted and destabilizes taxonomy. Stable nomenclature, however, is most important for “unambiguous communication about biodiversity” and names must be clearly assignable to specimens to allow “unambiguous identifications” (Pyle and Michel 2008: 40). Since pythons are also highly desired by both the skin and pet trades an established and widely accepted taxonomy with associated nomenclature is essential if they are to be protected and conserved. Any unnecessary and unscientific deviations from a well-founded taxonomy can only serve to further threaten already vulnerable wild populations.

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## Appendix I

A list of valid taxa of pythons recognized in this study. Doubtful names (*nomina dubia*) are not included.

***Antaresia*** Wells & Wellington, 1984

*Antaresia childreni* (Gray, 1842)

*Antaresia maculosa* (Peters, 1873)

*Antaresia perthensis* (Stull, 1932)

*Antaresia stimsoni* (LA Smith, 1985)

*Antaresia stimsoni stimsoni* (LA Smith, 1985)

*Antaresia stimsoni orientalis* (LA Smith, 1985)

***Apodora*** Kluge, 1993

*Apodora papuana* (Peters & Doria, 1878)

***Aspidites*** Peters, 1877

*Aspidites melanocephalus* (Krefft, 1864)

*Aspidites ramsayi* (Macleay, 1882)

***Bothrochilus*** Fitzinger, 1843

*Bothrochilus boa* Fitzinger, 1843

***Broghammerus*** Hoser, 2004 *fide* Rawlings et al., 2008

*Broghammerus reticulatus* (Schneider, 1801)

*Broghammerus reticulatus reticulatus* (Schneider, 1801)

*Broghammerus reticulatus jampeanus* (Auliya et al., 2002)

*Broghammerus reticulatus saputrai* (Auliya et al., 2002)

*Broghammerus timoriensis* (Peters, 1876)

***Leiopython*** Hubrecht, 1879

*Leiopython albertisii* (Peters & Doria, 1878)

*Leiopython bennettorum* Hoser, 2000

*Leiopython biakensis* Schleip, 2008

*Leiopython fredparkeri* Schleip, 2008

*Leiopython hoserae* Hoser, 2000

*Leiopython huonensis* Schleip, 2008

***Liasis*** Gray, 1842

*Liasis dubudingala* Scanlon & Mackness, 2002 [extinct species]

*Liasis fuscus* Peters, 1873

*Liasis mackloti* (Duméril & Bibron, 1844)

*Liasis mackloti mackloti* (Duméril & Bibron, 1844)

*Liasis mackloti dunni* Stull, 1932

*Liasis mackloti savuensis* (Brongersma, 1956)

***Liasis olivaceus*** Gray, 1842

*Liasis olivaceus olivaceus* Gray, 1842

*Liasis olivaceus barroni* LA Smith, 1981

***Morelia*** Gray, 1842

***Morelia azurea*** (Meyer, 1874)

***Morelia amethystina*** (Schneider, 1801)

***Morelia boeleni*** (Brongersma, 1953)

***Morelia bredli*** (Gow, 1981)

***Morelia carinata*** (LA Smith, 1981)

***Morelia clastolepis*** Harvey et al., 2000

***Morelia kinghorni*** Stull, 1933

***Morelia nauta*** Harvey et al., 2000

***Morelia oenpelliensis*** (Gow, 1977)

***Morelia riversleighensis*** (Smith & Plane, 1985) [extinct species]

***Morelia spilota*** (Lacépède, 1804)

*Morelia spilota spilota* (Lacépède, 1804)

*Morelia spilota cheynei* Wells & Wellington, 1984

*Morelia spilota harrisoni* Hoser, 2000

*Morelia spilota imbricata* LA Smith, 1981

*Morelia spilota mcdowelli* Wells & Wellington, 1984

*Morelia spilota metcalfei* Wells & Wellington, 1984

*Morelia spilota variegata* Gray, 1842

***Morelia tracyae*** Harvey et al., 2000

***Morelia viridis*** (Schlegel, 1872)

***Python*** Daudin, 1803

***Python anchietae*** Bocage, 1887

***Python bivittatus*** (Kuhl, 1820)

*Python bivittatus bivittatus* (Kuhl, 1820)

*Python bivittatus progschai* Jacobs et al., 2009

***Python breitensteini*** Steindachner, 1880

***Python brongersmai*** Stull, 1938

***Python curtus*** Schlegel, 1872

***Python europaeus*** Szyndlar & Rage, 2003 [extinct species]

***Python molurus*** (Linnaeus, 1758)

*Python molurus molurus* (Linnaeus, 1758)

*Python molurus pimbura* Deraniyagala, 1945

***Python natalensis*** A Smith, 1840

***Python regius*** (Shaw, 1802)

***Python sebae*** (Gmelin, 1788)

## Appendix 2

### A. Key to the genera of the Pythonidae

1. Visible sensory pits absent..... *Aspidites*
- Visible sensory pits present ..... 2
2. Rostral unpitted ..... 3
- Rostral pitted ..... 6
3. No visible black pigmentation between the scales ..... 4
- Black pigmentation visible between the scales ..... *Apodora*
4. Number of loreals fewer than 3 ..... 5
- Number of loreals more than 3 ..... *Antaresia*
5. Head color not black, head distinct from neck, two pairs of prefrontals .....
- ..... *Liasis*
- Head color black, head barely distinct from neck, one pair of prefrontals .....
- ..... *Bothrochilus*
6. Body unpatterned ..... *Leiopython*
- Body patterned ..... 7
7. Lateroposterior margin of nasal exposed, plane of ventral position of postorbital is directed anterolaterally, neck is markedly narrower than the head in adults..... *Morelia*
- Lateroposterior margin of nasal is covered by prefrontal, plane ventral position of postorbital is directed anteriorly, neck is slightly narrower than the head in adults ..... 8
8. Well defined square or triangular supralabial pits, infralabials less well developed and not set in a groove ..... *Python*
- Less well defined diagonal supralabial pits, infralabials placed in a longitudinal groove and ventrally in a fold ..... *Broghammerus*

### B. Key to the species and subspecies of the genera of Pythonidae

#### *Antaresia*

1. Body color pale yellowish-brown to dark purplish-brown ..... 2
- Head and neck color yellowish to reddish-brown ..... 3
2. Midbody scale rows 35 or fewer, ventrals fewer than 250, 34–45 subcaudals .....
- ..... *perthensis*
- Midbody scale rows 35 or more, ventrals more than 250, 38–57 subcaudals .....
- ..... *childreni*
3. Dorsal pattern of ragged-edged dark blotches ..... *maculosa*
- Dorsal pattern of smooth-edged blotches ..... 4
4. Ventrals 260–302..... *stimsoni stimsoni*
- Ventrals 243–284..... *stimsoni orientalis*

**Aspidites**

1. Head and neck color glossy black, numerous dark brown crossbands, ventrals more than 310 ..... *melanocephalus*
- Head and neck color yellowish to reddish-brown, black markings above the eyes, ventrals fewer than 305 ..... *ramsayi*

**Apodora**

Black skin pigmentation visible between head scales, rostral and (at least) second supralabial with shallow pits, prefrontals small or absent, ventrals 358–374, 83–88 subdaudals, low number of teeth on the maxilla ..... *papuanus*

**Bothrochilus**

Uniform brownish-black head barely distinct from the head, orange color body ring pattern that fades with age, lack of rostral and supralabial pits, low number of dentary teeth ..... *boa*

**Broghammerus**

1. Iris color olive-golden, midbody scale rows fewer than 64, ventrals fewer than 290 ..... *timoriensis*
- Iris color bright yellow to golden-orange, midbody scale rows 64 or more, ventrals more than 290 ..... 2
2. Ventrals more than 330 ..... *reticulatus saputrai*
- Ventrals fewer than 330 ..... 3
3. Ventrals fewer than 304 ..... *reticulatus jampeanus*
- Ventral more than 304 ..... *reticulatus reticulatus*

**Leiopython**

1. Dorsal color dark gray or blackish-blue fading to white on the flanks ..... *hoserae*
- Dorsal color yellow to brownish-violet fading to yellowish on the flanks ..... 2
2. One pair of enlarged parietals ..... *huonensis*
- Two pairs of enlarged parietals ..... 3
3. Whitish postocular spot absent ..... *fredparkeri*
- Whitish postocular spot present ..... 4
4. Two prefrontals, two or more loreals present ..... *bennettorum*
- One prefrontal, one loreal present ..... 5
5. Subocular absent, three labials enter the orbit ..... *albertisii*
- Subocular present, only two labials enter the orbit ..... *biakensis*

**Liasis**

1. Body unpatterned ..... 2
- Body patterned ..... 4
2. Midbody scale rows fewer than 50, ventrals fewer than 300 ..... *fuscus*
- Midbody scale rows more than 50, ventrals more than 300 ..... 3

3. Midbody scale rows 61–72, 355–377 ventrals ..... *olivaceus olivaceus*  
 – Midbody scale rows 58–63, 374–411 ventrals ..... *olivaceus barroni*  
 4. Eyes pale or white ..... *mackloti savuensis*  
 – Eyes silvery or dark ..... 5  
 5. Chin and infralabials yellowish of color, brownish ground color, females larger than male ..... *mackloti mackloti*  
 – Chin and infralabials of white color, grayish to reddish-brown ground color, males larger than females ..... *mackloti dunni*

### *Morelia*

1. Dorsal scales rough or keeled, large round frontal scale ..... *carinata*  
 – Dorsal scales smooth, frontal of different shape partly fragmented ..... 2  
 2. Two or more enlarged well-defined pairs of parietals ..... 11  
 – Small granular or fragmented head scales ..... 3  
 3. Body ground color shiny green with unpatternd head ..... *azurea, viridis*  
 (Note: *M. azurea* is a cryptic species, only distinguishable by genetic markers)  
 – Body ground color pale cream; red or brown with head pattern ..... 4  
 4. Loreal scales fewer than 28 ..... 5  
 – Loreal scales more than 28 ..... *bredli*  
 5. Body pattern of speckled appearance ..... *spilota spilota*  
 – Body pattern of pale and dark elements ..... 6  
 6. Lack of partial structure in the posterior margin of the nasal scale ..... 7  
 – Presence of partial structure in the posterior margin of the nasal scale ..... 8  
 7. Nostril not in contact with the internasals ..... *spilota imbricata*  
 – Nostril in contact with the internasals ..... *spilota metcalfei*  
 8. Dorsal color dark ..... 9  
 – Dorsal color pale cream with diagonal pale bars and lighter pattern, head pattern smudgy appearance ..... *spilota mcdowelli*  
 9. Body ground color dark brown or blackish ..... *spilota cheynei*  
 – Body ground color shade of brown or reddish-brown ..... 10  
 10. Body pattern consists of 60–70 pale rings ..... *spilota variegata*  
 – Body pattern with pale rings but connected by two lateral pale lines .....  
     ..... *spilota harrisoni*  
 11. Ventrals fewer than 400, subcaudals fewer than 125, infralabials fewer than 22, parietal scales not fragmented ..... 12  
 – Ventrals more than 400, subcaudals more than 155, infralabials more than 22, parietal scales fragmented ..... *oenpelliensis*  
 12. Overall glossy blackish head and body color with white or yellowish bars in the labials ..... *boeleni*  
 – Overall head and body color variable ..... 13  
 13. Neck bar pattern absent ..... 14  
 – Neck bar pattern present ..... 16  
 14. Postocular stripe absent ..... 15

- Postocular stripe present ..... *nauta*
- 15. Suboculars absent, single supraocular ..... *kinghorni*
- Suboculars present, 2–3 supraoculars ..... *clastolepis*
- 16. Iris color golden, 0–2 interparietals ..... *amethystina*
- Iris color red, 2–3 interparietals ..... *tracyae*

### ***Python***

- 1. Small or fragmented head scales ..... 2
- Large, well-developed head scales ..... 4
- 2. Midbody scale rows fewer than 75, subcaudal scale counts fewer than 50 ... 3
- Midbody scale rows more than 75, subcaudal scale counts more than 60.....  
..... *natalensis*
- 3. Ventral scale counts fewer than 210, subcaudals fewer than 38 ..... *regius*
- Ventral scale counts more than 250, subcaudals more than 46 ..... *anchietae*
- 4. Ventral scale counts fewer than 200 ..... 5
- Ventral scale counts more than 200..... 7
- 5. Ventral scale counts fewer than 167 ..... 6
- Ventral scale counts more than 167..... *brongersmai*
- 6. Anterior pair of parietals not in contact or are only weakly contacting *curtus*
- Anterior pair of parietals in broad contact at the medial structure.....  
..... *breitensteini*
- 7. Dorsal midbody scale rows fewer than 75 ..... 8
- Dorsal midbody scale rows more than 75..... *sebae*
- 8. Suboculars absent ..... 9
- Suboculars present, separating the supralabials from the orbit..... 10
- 9. Two preoculars present, subcaudals 66–70..... *molurus molurus*
- Three preoculars present, subcaudals 57–65..... *molurus pimbura*  
(Additional diagnostic information: longitudinal pink marking above the eyes, fewer dark blotches that also invade the ventral scutes)
- 10. Pale centered saddles, pale-centered brown blotches..... *bivittatus bivittatus*  
(Additional diagnostic information: attains larger size up to 5m in length)
- Prevalent saddles with pale margins, increased incidence of ocellic blotches  
(more molurus-like) ..... *bivittatus progschai*  
(Additional diagnostic information: does not exceed 2.5 m in total length)